History

For nearly 100 years, Meriam has been the leader in the development and manufacture of measurement and calibration solutions. Throughout our history, customers turn to us first because we've established the reputation as the reliable standard in the industry.

Whatever your need, count on Meriam to integrate proven and accurate technologies into all of the products we manufacture.

Whether you prefer the reliability found in our long-standing products such as our Accutube line, or value the convenience in our present day technologies like our smart handheld manometers – Meriam has every product you need to get the job done right.

And as your business expands, Meriam will be ready. We are harnessing newer technologies and developing products that will help your business streamline its costs and reduce downtime, all while maintaining the accuracy you've come to expect from us. Product lines such as Meriam's MFC 4150 HART® Communicator, MFT 4010 Modular Calibrator and our industry-leading wireless instrumentation have put us on the map for innovative products and dependable service for years to come.

So, next time your project calls for superior measurement and calibration products, consider Meriam to be your supplier. Our products and knowledgeable customer service staff will ensure we keep you on time and on budget.

Precision products. Precisely Meriam.

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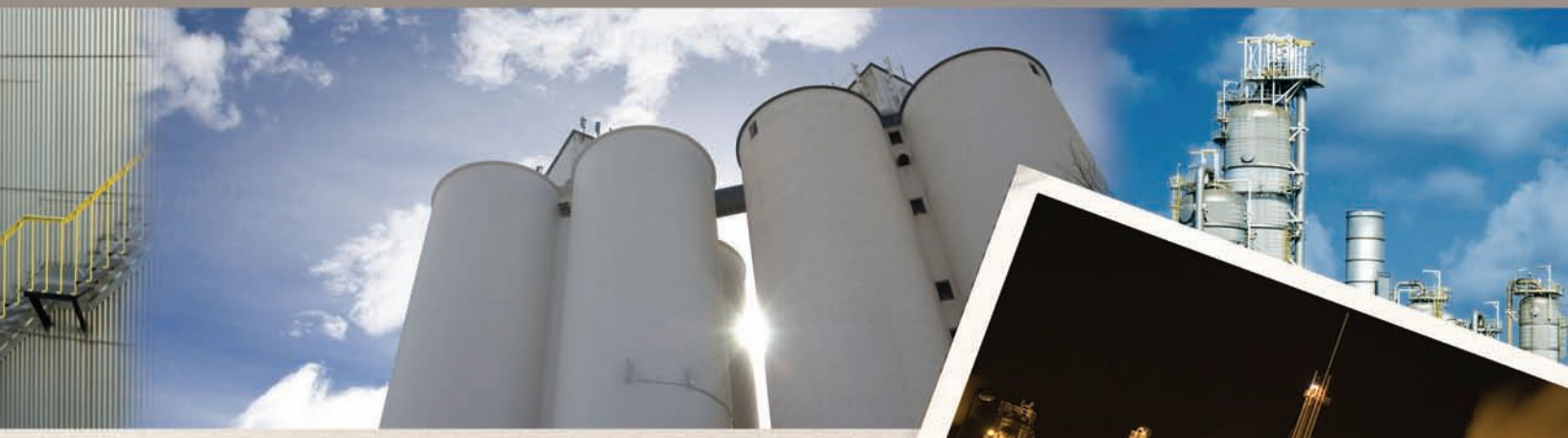

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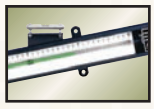

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Device Management Solutions

Meriam is the industry leader with its line of device management solutions. Whether you choose our MFC 4150 Hart® Communicator unit, or seek additional features with our MFT 4010 Hart Calibrator units, you can rest assured knowing that our compact, handheld units provide ease of use and rugged reliability.

PICTURE. PERFECT. PRECISION.

Meriam is recognized as a world class supplier of innovative instrumentation that is accurate, reliable, cost effective, rugged and easy to use. With nearly 100 years of expertise, Meriam offers problem-solving capabilities and the personal attention to customers that sets us apart. In-house technical support, published primers, selector guides, how-to manuals and application notes are all readily available to help you solve your measurement and calibration problems

MFC 4150

The MFC 4150 Series HART Communicator is the latest from Meriam Process Technologies and supports Universal, Common Practice and Device Specific commands. The MFC is designed for the life cycle of your plant process devices: commissioning, configuration and maintenance operations. HART field devices can be configured, polled and trimmed using the MFC. The MFC 4150 is a general purpose version for use in non-hazardous environments. The MFC 4150X is ATEX certified Ⓔx II 1 G, EEx ia IIC T4, Class I, Div. 1 Groups A, B, C, D: T4 for use in potentially hazardous environments.

This HART Communicator is designed for optimum convenience and usability. The MFC 4150 and 4150X never need to leave your hands for updates. New operating firmware and device profiles are downloaded via the Internet, saving time and increasing availability.

MFT 4010

MFT 4010 is the instrument of choice for technicians in every industry. The MFT 4010 delivers the versatility of a modular calibrator and the convenience of HART communications in one handheld unit.

Our MFT 4010 combines the convenience of three module bays for a variety of pressure, temperature and electrical measures and simulate modules with integral voltage and current meter. With HART communications and documentation capability, this is the one tool that can replace several in the field.

Modules

Meriam offers sensor module options that cover a wide range of pressure, temperature, voltage and current measurement requirements.

- Pressure modules measure differential, gauge and absolute pressure
- VMA0055 – DC Voltage/Current Measurement and Simulation Module
- TIO0110 – Thermocouple Measurement and Simulation Module
- RIO4000 – RTD Measure and Simulation Module for MFT 4010

DMS

Device Management System (DMS) is a Microsoft SQL based software package that manages all aspects associated with the life cycle of devices in your plant.

The DMS takes an integrated approach to configuration and calibration management with its seamless interface to Meriam's documenting calibrator and communicator, the MFT 4010 series, and MFC 4150 for commissioning and configuration.

Scalable and flexible to accommodate any size operation.

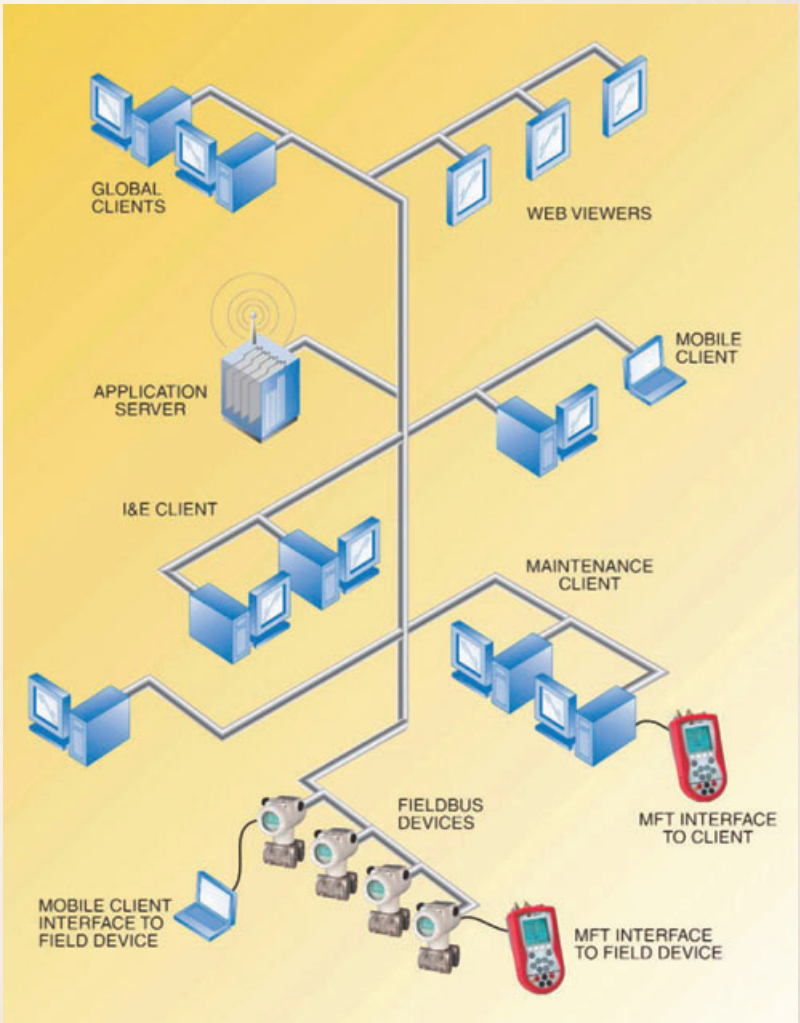
DMS is designed for easy scalability, in terms of clients and devices. Functionality is limited by user group definitions and permissives, so that only authorized personnel make changes to devices.

The DMS base software is a full featured calibration and configuration management tool and supports HART® Fieldbus Technology. Software modules extend the feature set to include major functionality such as online features to support connectivity to device networks.

New device model releases and revisions are maintained on our web site. These device model library additions and DMS software service packs are available from our download web site.

New devices can be configured and installed by cloning similar existing devices. The source for cloned devices exists as an off-the-shelf device or a device modeled in the DMS database. With DMS, you are able to clone an entire system and use it as a baseline for developing a similar system for a new division, streamlining plant expansion and Greenfield projects. DMS is the complete device management solution for the life cycle of your process plant.

Device Management System



MFC 4150 HART® Communicator

The MFC 4150 HART® Communicator is the latest HART communicator from Meriam Process Technologies. HART field devices can be configured and trimmed using the MFC. The MFC is a full function HART Communicator with time-saving features that optimize commissioning, configuration and maintenance operations.

MFC 4150 supports all HART devices at the Universal and Common Practice command levels plus a large and growing list of devices at the Device Specific command level. View our field device list by going to **www.meriam.com** and selecting Resources / Download Center / Available DOFs.

WE'VE GOT HART COMMUNICATION PROTOCOL ABILITY

MFC 4150 shown with dongle (standard accessory)

MFC 4150 Advantages

The MFC offers several unique features that provide HART users with a more useful, more reliable and more available communication tool. Just consider the MFC 4150's features:

- Quick start up and connect: 15 seconds!
- 60 hours battery life (w/o backlight)
- 28 hours battery life with backlight
- Update new device profiles and firmware from Meriam via the Internet – the MFC 4150 is never out of your hands
- Clone / Upload / Download configurations
- Off-line mode for editing / reviewing configurations
- Document and store 200 configurations
- 13-line, 128 x 128 graphic, backlit display
- Dongle coordinates AC power adapter and serial communications
- Full alpha-numeric keypad
- Review / Edit on the fly
- Quick Menu short cuts for commonly used commands
- HART menu Home key
- Dedicated text edit keys
- Programmable lock-out settings
- Contrast key for direct adjustment in any mode
- Elastic hand strap, adjustable shoulder strap and soft carrying case
- Left side thumb keys for one-handed navigation

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M4 SERIES

MFC 4150

HART® Communicator

Ordering Information

Model Numbers

- MFC 4150 — CE, General Purpose
- MFC 4150X — CE, ATEX I.S., $_{c}UL_{us}$

Standard Accessories

- Z4150-7R — Protective red boot
- Z4150-13 — Soft carrying case with shoulder strap
- Z4150-10A — Dongle for communications and AC adapter
- 9B00007 — Universal AC adapter
- A907447-00052 — DB-9 cable, Male x Female 6ft length; required for updates / communication

Industry Applications

Common Applications

Commission devices
- Step-by-step configuration
- Document as-left configuration

Operations
- Reconfiguration for process changes
- Reconfiguration for batch runs
- Document as-found and as-left configurations
- Populate DMS database (see companion products below)

Device Maintenance
- Troubleshoot devices with HART
- View device error messages
- Clone devices to commission replacements

Features

Standard Features Included

- Standard Documenting; Refer To DMS Software Datasheet
- HART® lead kit
- Protective Rubber Boot
- RS-232 Serial Cable
- Power adapter 120 to 240 VAC, 50 – 60 Hz and Universal Plug Adapter Kit
- AA alkaline batteries (6 each)
- Hard copy user's manual
- DPC Manager Utility for updating MFC
- CE for EMC testing (all models)
- Intrinsically Safe (MFC 4150X only) ATEX certification by DEMKO

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Companion Products

Combine the MFC 4150 with our MFT 4010 Calibrator / Communicator and Device Management System (DMS) software and the trio offers the only single-source device management solution capable of meeting all aspects of device management.

Device Management System (DMS)

Full calibration and configuration management database. Featuring secure device history, report generation and search functions. Use with MFT / MFC.

MFT 4010 Multifunction Calibrator / HART Communicator

Three module bays, documenting from stored or manual procedures, full HART communications support for analytic, flow, level, pressure temperature and valve type devices.

Specifications	
Base Unit	10⅜"L x 4¼" to 2½"W x 1¼" to 1⅞"D; ABS plastic case, 1.7 lbs. (w/batts.)
Keypad	Membrane keypad: 4 soft, 8 single function, 30 dual function, 3 thumb
Display	13 line, 128 x 128 pixel graphic display, 2.1" x 2.1" viewable area, backlight
Power	Six AA alkaline or NIMH batteries; or 100-240 VAC power adapter Use only approved alkaline batteries for MFC 4150X units
Connections	Standard banana jacks (¾" center) for HART®, Odu connector for dongle. Dongle coordinates AC adapter power and DB-9 serial communications.
4150 Certifications	CE EMC testing as battery powered, portable
4150X Certifications	Intrinsically safe (approved AA alkaline batteries only) Ex II 1 G; EEx ia IIC T4 Intrinsically safe, Exia Class I, Div. 1 Groups A, B, C, D: T4 -5ºC<Ta<+50ºC
Temperature Specifications	Storage: -40°F to 140°F (-40°C to 60°C) Operating: 23°F to 122°F (-5°C to 50°C)

MFT 4010 with RTD module and PT100 probe

Modules interchangeable in 3 bay locators

HART® COMMUNICATION PROTOCOL

MFT 4010 Modular Calibrator

with HART® Communication Option

The MFT 4010 is a break-through combination calibrator / HART communicator that truly reduces the time spent on field calibrations. The MFT 4010 Series delivers the versatility of a calibrator and the convenience of HART communications in one handheld unit. Users can view up to four measurements simultaneously on the high resolution LCD or compare HART PV and AO values to corresponding values measured by the NIST traceable MFT. Available modules include differential, gauge, vacuum and absolute pressure as well as temperature and voltage/current. A voltage and current meter is integral to the base unit. All HART field devices can be configured, polled and trimmed using HART communications. Device Specific commands for supported devices are included with the MFT.

MFT 4010 Advantages

All-In-One Tool – takes the place of multiple handheld instruments, simplifies workload and improves productivity.

Automation for HART field devices – calibration is automated through auto setup of the calibrator based on the device settings; digital trims automate the device adjustment steps.

Calibration Types Supported – pressure, t/c, RTD, I/P, P/I, Switch, Loop and mA/V for conventional HART transmitter or local indicators.

Document As found and As left Calibration Results – Create calibration procedures on the handheld or download them from compatible device management software. Save results to non-volatile memory.

Field Updates – uses Internet downloads to update and add capability / HART support.

Modules – select from a variety of positive-lock measurement modules for excellent versatility.

Field Recertification – sensor modules and integral V/I can be recalibrated for zero, span and linearity via the MFT.

User Interface – 2.1" x 2.1" display, four soft keys (definitions change with mode requirements) and eight hard keys provide user interface. Display is configurable for 1 to 4 simultaneous measurements.

User Convenience – Auto shut off, Damping, Min/Max value capture, display Hold, sensor Zero, direct Contrast adjustment.

Security Lockout – Lockout specific MFT settings or all at one time.

Diagnostics – MFT 4010 self-tests upon power up and upon installation of sensor modules. Advisories are posted on the display.

Dedicated DOF Memory – memory for 500 HART device drivers.

Measurement Units – customary English and Metric System units are selectable.

Hard carrying case shown.
Soft case also available.

MFT 4010

Modular Calibrator with HART® Communication Option

Ordering Information

Model Numbers

- MFT 4000-11-1-00 CE
- MFT 4000-11-1-01 CE & IS
- MFT 4005-11-1-00 HART P/T Trans., CE
- MFT 4005-11-1-01 HART P/T Trans., CE, IS
- MFT 4010-11-1-00 HART, CE
- MFT 4010-11-1-01 HART, CE, IS

Standard Accessories

- 3 Blank inserts for open sensor bays
- AC Power adapter, 100 - 240 VAC for US plug, International plug kit
- HART® lead kit with 250 ohm shunt adaptor for HART communication (MFT 4010)
- Test lead kit
- RS-233 Serial communications cable
- Hard copy user's manual
- Protective rubber boot

Optional Accessories

- Pressure Modules (See page 10-11)
- RIO4000 RIO Module
- TIO4000 TIO Module
- VMA0055 VMA Module
- Soft carrying case with shoulder strap carries base unit, modules, pump, lead kits and fittings/tubing
- Hard carrying case with handle – foam insert for base unit with 3 installed modules/fittings, 4 additional modules, lead kits, hand pump, RTD probe, fittings
- Kits – Consult factory for details

Supported Calibrations

- Pressure gauges, transmitters, switches
- Temperature gauges, transmitters, switches
- Level (hydrostatic)
- P/I, I/P, P/P converters
- Loop simulations
- Much more!

Models & Options

MFT 4000 Calibrator
Base unit for calibration work with selected NIST traceable sensor modules & integral voltage/current meter.

MFT 4005 Calibrator with HART® Trims
MFT 4000 with HART support limited to analog and digital trims for calibration support.

MFT 4010 Calibrator with HART®
Base unit for modules and full Device Specific HART communications. Quick Cal displays HART PV and AO along with MFT's NIST traceable measurements. User can identify needed trim(s) and access the trim function(s) from same display. Smart Trim allows selection of analog or digital trims without navigating through menu trees.

Documenting
Documenting memory and firmware for use with Meriam DMS software. Stores up to 200 HART configuration files and over 100 calibration results (as-found & as-left data [up to 21 points each], time/date info, tag). Communicate with PC via DB-9 connector.

Companion Products

Device Management System (DMS)

Full calibration and configuration management database. Featuring secure device history, report generation and search functions.

MFC 4150 HART Communicator

The most reliable, most useful and fastest connecting HART communicator available.

Specifications

Base Unit	9.00"L x 4.70"W x 3.58"D ABS plastic case with shock absorbing boot, 28 ozs, three bays for measurement modules
Keypad	Overlay keypad with 10 dome contact style buttons and 4 soft keys. Alpha entry based on LCD alpha matrix; numeric entry with buttons.
Display	128 x 128 pixel graphic display, 2.1" x 2.1" viewable area, 5-digit resolution
Power	6 AA alkaline or NiMH batteries; Optional 100 – 240 VAC power adapter
Connections	Standard banana jacks (¾" center) for ±50 mA/Volts and for HART
Data Transfer	DB-9 for RS-232C
Certifications	CE Approval. Intrinsically Safe, Class I, Div I areas per CSA 22.2 & UL 913 by MET Laboratories
Temperature Specifications	Storage: -40°F to 140°F (-40°C to 60°C) Operating: 23°F to 122°F (-5°C to 50°C)
NIST Traceable Accuracy	Current / Voltage: ± 0.025% of F.S. ± 0.001% of Span per °F (ref. temp. 70°F). (see Modules for accuracy)
Modules	2.3"L x 1.3"W x 2.6"D, 8.3 ozs or less. Positive-lock with spring latch. Depress latch to release. Electrical connections are PC board contacts to receivers on base unit. Blank inserts protect any empty bay(s).

Pressure Modules

for use with MFT 4000, MFT 4005 and MFT 4010

Pressure Sensor Modules from Meriam Process Technologies are available in a several types and ranges to provide the ultimate in flexibility and convenience for portable calibration standards. Meriam pressure modules are used with any MFT 4000 Series Multi-Function Tester by installing modules into any of three (3) MFT sensor bays. The modules are completely interchangeable to facilitate most pressure testing needs (restrictions on module installation and removal apply to Intrinsically Safe MFT units).

NIST traceable accuracy of ± 0.025% FS is available for most pressure ranges and types. This accuracy statement includes all effects of linearity, hysteresis, repeatability and temperature from 23°F to 122°F (no partial temperature compensation here!). A NIST certificate and calibration data are included with each module for quality assurance purposes.

Pressure Measurement Module Advantages

Calibration coefficients for all modules are stored in non-volatile sensor module memory. This means any pressure module can be used in any Meriam MFT without manual programming of coefficients. When a module is installed and the MFT is powered up, the MFT senses the module bay connection, polls the module for the calibration coefficients and configures the display for pressure readout in the last engineering unit selected. Engineering units, including PSI, centimeters or inches of H_2O (at 4°C, 20°C, or 60°F), kg/cm^2, kPa, mBars, Bars, millimeters, inches of Hg (at 0°C ref. temp) and oz/in^2 are all selectable from the MFT keypad.

Meriam sensor modules are designed to be re-calibrated in the field with appropriate local calibration standards. The MFT's Rcal feature allows customers to adjust zero (offset) and full scale (gain) plus up to seven (7) addition points on the calibration curve. Dead weight testers are generally used to apply a known pressure to a module. The Rcal feature allows the user to key in the applied pressure value, which lets the module know how to correct its calibration curve. Meriam also provides factory re-calibration services for pressure modules including complete documentation and certification.

Pressure Modules

for use with MFT 4000, MFT 4005, and MFT 4010

Ordering Information

Pressure Modules: See Accuracy Table for Model Numbers

Accessories

ZB34686 961P pressure pump with integral variator, bleed valve, ⅛" FNPT connection, 0 - 145 PSIG

ZB34700 961V vacuum pump with integral variator, bleed valve, ⅛" FNPT connection, vacuum 0-650 mm Hg

ZA34386 Low Pressure Connector Kit (not for use above 250 PSIG)

ZA34102 ⅛" O.D. tubing to ⅛" MNPT connector (not for use above 250 PSIG)

ZA34112 ⅛" O.D. tubing union tee (not for use above 250 PSIG)

ZA34099-1 ¼" MNPT x ⅛" FNPT reducer bushing, brass

ZA34103-2 10 ft. of ⅛" O.D. nylon tubing (not for use above 250 PSIG)

ZA36853 Push to read equalizing manifold for DP modules, brass, ⅛" FNPT connections

ZA900020-90502 High Pressure Connection Kit, 3' hose (not for use above 9,000 PSIG)

ZA900020-90503 High Pressure Connection Kit, 1' hose (not for use above 9,000 PSIG)

ZA900020-90501 5 pcs 1/4" MNPT x HP Quick Connect Fitting (not for use above 9,000 PSIG)

ZA900436-00001 1 pcs ⅛" MNPT x HP Quick Connect fitting (not for use above 9,000 PSIG)

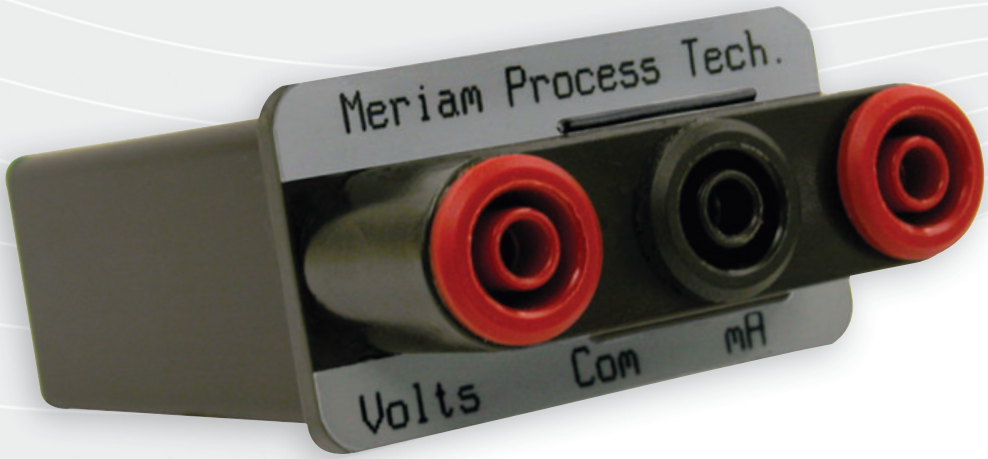
Available Pressure Modules

Accuracy	Model	Pressure Range	Accuracy	Type
±.10% *	FDN0010	0-10" H_2O	± 0.01" H_2O dp	Differential
	FDN0020	0-20" H_2O	± 0.020" H_2O dp	Differential
±.025% *	DDN0100	0-100" H_2O	± 0.025" H_2O dp	Differential
	DDN0200	0-200" H_2O	± 0.05" H_2O dp	Differential
	DDN0400	0-400" H_2O	± 0.10" H_2O dp	Differential
	DDN2000	0-2000" H_2O	± 0.50" H_2O dp	Differential
	DGI0020	0-20 PSIG	± 0.005 PSIG	Gauge
	DGI0200	0-200 PSIG	± 0.05 PSIG	Gauge
	DGI0500	0-500 PSIG	± 0.125 PSIG	Gauge
	DGI1000	0-1000 PSIG	± 0.25 PSIG	Gauge
	DGI1500	0-1500 PSIG	± 0.375 PSIG	Gauge
	DGI2000	0-2000 PSIG	± 0.500 PSIG	Gauge
	DAI2000	0-2000 mm Hg	± 0.50 mmHg Abs	Absolute
	DAI0900	0-900 mm Hg	± 0.225 mmHg Abs	Absolute
	DAI5200	0-100 PSIA	± 1.30 mmHg Abs	Absolute
±.05% *	GGI3000	0-3000 PSIG	± 1.50 PSIG	Gauge

**** Includes all effects of linearity, hysteresis, repeatability and temperature from 23°F to 122°F***

Specifications

Temperature Specifications	Storage: -40°F to 140°F (-40°C to 60°C) Operating: 23°F to 122°F (-5°C to 50°C)
Model codes and uses	xDN: Differential Non-isolated – clean, dry, non-corrosive gases only xGI: Gauge Isolated – medias compatible with 316SS xAI: Absolute Isolated – medias compatible with 316SS
NIST Traceable Accuracy	See specification in Table above
Connections	⅛" FNPT, 316SS
Pressure Limits	xGI / xAI modules: 2X range / 316SS compatible xDN modules: 2X range when pressurized on high side only, 150 PSI when applied simultaneously to high and low sides
Certifications	CE Mark (standard) NIST traceability certificate (standard) Intrinsically Safe, MET Laboratories per CSA C22.2 & UL Class I Division I (standard on all pressure modules)



VMA0055

DC Voltage/Current Measurement and Simulation Module

The VMA0055 is a DC voltage and current measurement and simulation module for use with the Meriam MFT 4000 Series Multi-Function Tester. The module features the functionality of a DVM and loop calibrator for convenient field versatility. When used with other MFT functions, the VMA / MFT combination provides valuable functionality not available in other devices. Measurement ranges include ±500 mV, ±55 V, and ±100 mA. Sourcing capabilities include ±1000 mV, 0 – 24 V and 0 – 22 mA. The VMA module will also simulate transmitter outputs when connected to a loop or it can be used to temporarily supply 24V DC loop power to unpowered devices during commissioning or calibration activities.

VMA0055 Advantages

VMA0055 goes far beyond the ±50 volts / mA measurement capability of the MFT base unit and has its own isolated power supply so common ground problems are not an issue. Consider the following advantages for MFT users:

Power a transmitter directly from VMA
- Use MFT 4000, 4005 & 4010 to calibrate transmitters anywhere, anytime
- Concurrently use MFT base unit to check transmitter input (P, T, V, i) and output
- Use MFT 4010 HART® communications to commission or reconfigure unpowered transmitters

Measure mV, V or mA as you would with a DVM
- Reduce the number of tools the technician carries
- Resolution to 1/100,000 counts
- Select desired V range for best possible accuracy

Source precise voltage or mA signals to check calibration or operation of receiving devices or step a valve positioner
- Key in exact output value desired
- Increase or Decrease output value by predefined increments
- Auto-step tests are user defined for start and stop values, number of steps, dwell time, and manual or automatic advance

Read volts or mA from MFT meter while sourcing volts or mA from VMA module
- Test input isolation buffers with one MFT; apply mA value to buffer input with VMA and measure mA value output of buffer
- Select mA or V measurement on MFT meter from the VMA output display without interruption of output

Simulate transmitter output in externally powered loop
- VMA modulates loop current to any selected value
- Increase or Decrease simulated value by predefined increments
- Auto-step tests are user defined for start and stop values, number of steps, dwell time, and manual or automatic advance

I/P Device and Switch testing
- Combined with a pressure module, perform I/P testing
- Use VMA power source to wet switch contacts and use pressure and temperature modules for pressure and temperature switch testing

Available certifications include:
- CE Mark; NIST traceable – standard
- Intrinsically Safe – MET Laboratories per CSA C22.2 & UL 913 Class I Division I, Groups A, B, C & D

VMA0055

DC Voltage/Current Measurement and Simulation Module

Resolution, Range, and Accuracy Specification for VMA0055 Module

Ambient temperature limits: -10°C to +50°C
Accuracy statements are for ambient temperatures of 18°C to 28°C.
Apply the Temperature Coefficient for ambient temperatures below 18°C and above 28°C

DC Current (mA) Measure and Source Modes

Specifications	Measure Mode	Source Mode (No External Power)
Resolution	.001 mA	.001 mA
Range	±100.000 mA (55 VDC compliance)	0 - 22.000 mA (See Note 3 below)
Accuracy	± (0.01% of reading + 0.015% FS)	± (0.01% of reading + 0.015% FS)
Open Circuit Voltage		24 VDC
Output Drive		15 VDC minimum @ 24 mA, Resistive load
Temperature Coefficient	± (0.001% Rdg +0.002% FS) / °C	± (0.003% Rdg +0.003% FS) / °C

Volts DC Measure and Source Modes

Specifications	Measure Mode	Source Mode (No External Power)
Resolution	1/100,000 counts: .001 mV; .001 V	1/100,000
Range	±500 mV; ±1, 2, 4, 8, 15, 30, 55 V	0 - 24.000 VDC
Accuracy	± (0.025% of reading + 0.005% FS)	± (0.01% of reading + 0.05% FS)
Open Circuit Voltage		24 VDC
Output Drive		15 VDC minimum @ 24 mA, Resistive load
Temperature Coefficient	± (0.001% Rdg +0.0015% FS) / °C	± (0.0025% Rdg +0.0035% FS) / °C

Ordering Information

Model Numbers

VMA0055-11-1 VMA Module

Accessories

ZA900529-00015 VMA Test Lead Kit: banana plugs on 9" breakouts (both ends), assorted connectors (recommended for source and simulate functions)

Notes

1. Nominal resistance at VMA current terminal is 10 – 15 Ω

2. Output load line is linear

3. Unit operating time de-rated at high temp and high current as follows:
- Continuous operation @ 50ºC and 20mA
- 15 minutes typical @ 50ºC and 24mA (unit will shut down to prevent thermal damage)

2-Wire Transmitter Simulation Mode

Specifications	Simulation (External Power)
Resolution	.001 mA
Range	0 – 24.000 mA
Accuracy	± (0.01% of reading + 0.015% FS)
Loop Voltage Limits	1 VDC min., 55 VDC max.
Temperature Coefficient	± (0.003% Rdg +0.003% FS) / °C

Loop Power Mode

Specifications	Regulated Power Source
Range	24 VDC
Open Circuit Voltage	24 VDC
Output Drive	15 VDC Min. @ 24mA, Resistive load

TIO0110

Thermocouple Measurement and Simulation Module

The TIO0110 is a thermocouple (T/C) measurement and simulation module for use with the Meriam MFT 4000 Series Multi-Function Tester. The module will accurately measure or source ±110 milli-Volts (mV) for any of twelve (12) different T/C types according to NIST 175, ITS-90 (default) or ITS-68 standards. In the measure mode, the TIO0110 module converts mV dc to a temperature value in the user-selected temperature unit (°F, °C, °R or °K) and per the selected standard. Milli-volts can also be displayed for direct reading or trouble shooting needs.

In the simulate mode, the TIO0110 module simulates an accurate mV signal to a receiving device. Users can enter the precise simulation temperature value, change the value with convenient controls on the MFT, or set-up and select from three Auto-Step or three Auto Ramp test procedures per T/C type. Test points are determined by the user and can be stepped through automatically or manually as desired. See T/C Table 1 below for available T/C types and measurement / simulation accuracy.

T/C calibration coefficients are factory loaded into module memory for instant access by the base MFT. Field recalibration of the module is possible using the MFT's "Rcal" feature (appropriate calibration standards are required).

Table 1: TIO0110 Accuracy Table

T/C Type	Measurement Range	Measurement Accuracy	Simulation Accuracy
J	-210ºC to 1200ºC	±0.3ºC	±0.5ºC
K	-200ºC to 1372ºC	±0.5ºC	±0.5ºC
T	-200ºC to 400ºC	±0.3ºC	±0.5ºC
E	-200ºC to 1000ºC	±0.3ºC	±0.5ºC
N	-200ºC to 1300ºC	±0.3ºC	±0.5ºC
R	-50ºC to 1768ºC	±1.0ºC	±1.0ºC

T/C Type	Measurement Range	Measurement Accuracy	Simulation Accuracy
S	0ºC to 1768ºC	±1.0ºC	±1.0ºC
B	250ºC to 1820ºC	±1.0ºC	±1.0ºC
C	0ºC to 2315ºC	±0.5ºC	±0.5ºC
D	0ºC to 2315ºC	±0.5ºC	±0.5ºC
M	0ºC to 1410ºC	±0.5ºC	±0.5ºC
P	0ºC to 1395ºC	±0.5ºC	±0.5ºC

TIO0110

Thermocouple Measurement and Simulation Module

MFT 4010 with TIO 0110 module
simulate T/C input to transmitter

MFT display for T/C Simulate mode

TC Simulation			
Simulation Mode			
Start			
Units: C			
Step Value: 25 C			
→ Auto Step 1			
Auto Step 2			
Auto Step 3			
Auto Ramp 1			
Auto Ramp 2			
Auto Ramp 3			
Up	Down	Select	Back

MFT 4010 with TIO 0110 Module
T/C measure and simulate module

MFT display for T/C Setup mode

TC Setup			
Current Settings			
→ TC Type	J		
Standard	ITS 90		
Resolution	0.1 deg		
Simulate Mode			
User Re-Calibrate			
Up	Down	Select	Back

Ordering Information

TI00110-11-1 T/C Measure / Simulate Module

Accessories

ZA37062 TIO 0110 Starter Kit (Includes t/c wire kits for types E, J, K, N, T, BK and R/S plus mV cable.)

Specifications	
Input Impedance	> 10 megohms
Warm-up time	≤ 1 Minute to full rated accuracy
mV Accuracy	± 0.025% R + 0.005% FS
Temperature Effect	≤ 2uV/°C
T/C Meas. Accuracy	± 0.3°C for E, J, K, N, & T types
T/C Meas. Accuracy	± 1.0°C for B, R & S types
T/C Meas. Accuracy	±0.5°C for C, D, M & P types
Connector	- Measure: standard mini-T/C connector - Source: standard mini-T/C connector
Temperature	Storage: -40°F to 140°F (-40°C to 60°C) Operating: 23°F to 122°F (-5°C to 50°C)
Cold junction effect	± 0.5°C max
Resolution	± 0.1° or ± 1° for T/Cs, ± 0.001 for mV
Voltage range	± 110.000 mV dc
Units	°F, °C, °R, °K, mV
Weight	3 ozs
Power	Supplied from MFT (simulate mode only)
Available certifications	NIST traceable mV functions – standard Intrinsically Safe – MET Laboratories per CSA C22.2 & UL 913 Class I Division I, Groups A, B, C & D

RIO4000

RTD Measure and Simulate Module for Meriam MFT 4000

The RIO4000 is the RTD measure and simulate module for the Meriam MFT 4000 Series Multi-Function Tester. The module accurately measures or simulates the resistance of 22 different RTD sensor types with nominal resistance to 4000 ohms. 2-, 3-, and 4-wire RTDs are supported for various RTD types; platinum, copper, nickel or iron. Common alpha coefficients are supported per Table 1. The module can simulate temperature to all conventional or smart temperature transmitters and signal conditioners.

The MFT converts measured resistance to a corresponding temperature value and displays the value in the user-selected temperature unit (°F, °C, °R or °K). Ohms can also be displayed for direct reading or troubleshooting. Pt 100 RTD probes are available from Meriam for use with the module. The Meriam RTD probes are 4-wire, DIN Class A probes, which come complete with handle, 5' coiled cable and connector. Accessory connectors are available to connect to any RTD or temperature transmitter for measurement or simulation applications. The RTD Simulation mode can be setup by entering a specific temperature or a range of temperatures for stepping and ramping functions.

Table 1: Supported RTD Materials / Nominal Resistance

Material	R0	ALPHA	Rs(ID)	Temp Range
Platinum	25.5	0.00392	17.8	-200°C to +630°C
Platinum	98.129	0.00392	21.5	-200°C to +600°C
Platinum	100	0.00385	100	-200°C to +850°C
Platinum	100	0.00392	46.4	-200°C to +630° C
Platinum	100	0.00391	56.2	-200°C to +630°C
Platinum	100	0.00393	68.1	-200°C to +850°C
Platinum	100	0.00389	82.5	-200°C to +630°C
Platinum	200	0.00385	178	-200°C to +630°C
Platinum	200	0.00392	215	-200°C to +630°C
Platinum	470	0.00392	261	-200°C to +630°C
Platinum	500	0.00392	316	-200°C to +630°C

Material	R0	ALPHA	Rs(ID)	Temp Range
Platinum	500	0.00391	383	-200°C to +630°C
Platinum	500	0.00385	464	-200°C to +630°C
Platinum	1000	0.00385	1000	-200°C to +630°C
Platinum	1000	0.00375	1210	-50°C to +500°C
Copper	9.035	0.00427	12.1	-100°C to +260°C
Copper	100	0.00427	121	-100°C to +260°C
Nickel	100	0.00618	31.6	-60°C to +160°C
Nickel	120	0.00672	147	-80°C to +260°C
Iron	604	0.00518	562	-100°C to +200°C
Iron	908.4	0.00527	681	-100°C to +200°C
Iron	1816.81	0.00527	1470	-100°C to +200°C

The table above lists the RTDs supported by the RIO4000 module and MFT 4000 Series. Materials, types and alpha coefficients are based on popular RTDs used in the field.

Meriam offers Pt 100 accessory probes that are automatically recognized by the RIO4000 module. No set up is necessary on the MFT. Users can configure their own reference RTDs similarly by using the accessory connector and Rs resistor (Probe ID resistor listed in the table above) to connect their RTD. This technique allows the module to automatically recognize the connected RTD and load its characteristics. If no Rs resistor is used, a copper wire must be installed in its place. This causes an RTD selection menu to automatically appear on the MFT display, enabling the user to configure the MFT for use with any supported RTD type.

RIO4000

RTD Measure & Simulate Module for MFT 4000

Table 2: RIO4000 Accuracy Table

RTD Type	(α)	Operating Temperature 18ºC < T < 28°C* T Range (°C)	Measure (2, 3, 4 wire)	Simulate (2 wire**)
Pt 100	385	-200 to 0	0.3	0.3
		0 to 400	0.4	0.4
		400 to 850	0.5	0.6
Pt 100	389, 391	-200 to 0	0.3	0.4
		0 to 360	0.4	0.6
Pt 100	392	-200 to 0	0.4	0.4
		0 to 360	0.5	0.6
Pt 100	393	-200 to 0	0.5	0.4
		0 to 400	0.4	0.5
		400 to 850	0.6	0.6
Pt 200	385, 392	-200 to 0	0.2	0.4
		0 to 400	0.6	0.5
		400 to 630	0.8	0.6
Pt 500	385, 392	-200 to 0	0.2	0.4
		0 to 400	0.3	0.5
		400 to 630	0.4	0.6

Ambient temperature limits: -10ºC to +50ºC
Accuracy statements are for ambient temperatures of 18ºC to 28ºC.
Apply the Temperature Coefficient for ambient temperatures below 18ºC and above 28ºC
*Temperature Coefficient = 0.02 ºC / ºC
** For Simulation, Manufacturer's 2 Wire Simulation Cable is required.

RTD Type	(α)	Operating Temperature 18ºC < T < 28°C* T Range (°C)	Measure (2, 3, 4 wire)	Simulate (2 wire**)
Pt 500	391	-200 to 0	0.2	0.4
		0 to 400	0.4	0.5
		400 to 630	0.5	0.6
Pt 1000	385	-200 to 0	0.2	0.4
		0 to 400	0.3	0.5
		400 to 630	0.4	0.6
Pt 1000	375	-50 to 0	0.3	0.4
		0 to 500	0.3	0.5
Cu 10	4274	-100 to 0	2	2
		0 to 260	2	2
Cu 100	4274	-100 to 0	1	1
		0 to 260	1	1
Ni 100	618	-60 to 160	0.2	0.4
Ni 120	672	-80 to 260	0.2	0.4
Fe 604	518	-100 to 200	0.3	0.5
Fe 908	527	-100 to 200	0.3	0.5
Fe 1816	527	-100 to 200	0.2	0.5

Note: Simulation Accuracies hold true on Pulsed Type Transmitters when they are placed in "Active Calibration" mode, or a similar continuous mode. Consult temperature transmitter manual or factory for more detail.

Ordering Information

RIO4000-11-1	RTD Measure/Simulate Module

Accessories

ZA900028-90200	Connector solders to a customer's RTD wiring to facilitate connection to the RIO4000 module
ZA900028-90201	Pt 100 RTD, DIN Class "A", 0.00385 alpha, 4 leads, ¼" O.D., 304SS probe, 10" probe length, 3.5" handle and 5 ft coiled cable with connector for RIO4000 module.
ZA900028-90500	Measure Cable to connect the RIO4000 module to RTD wires or transmitter terminals. Used for Measure Mode only. (Do not use for Simulation Mode) (Rs= 0.0 Ohms)
ZA900028-90502	2-Wire simulation cable. (Rs = 7.5 Ohms)
ZA37063	RTD Starter Kit; includes A900028-90200/-90500/-90502

Specifications	
0-400 Ω Measurement Accuracy	±0.01% of R + 0.075 Ω
0-400 Ω Simulation Accuracy	See Table 2 Pulsed excitation current support
400-4000 Ω Measurement Accuracy	±0.01% of R + 0.237Ω
400-4000 Ω Simulation Accuracy	See Table 2 Pulsed excitation current support
Resistance Range	0 – 4000 ohms
Input impedance	> 10 megohms
Mating Connector	Switchcraft #TA6FL
Units	°F, °C, °R, °K, ohms
Temperature	Effect: ≤ 0.001 ohm/ ºC Storage: -40°F to 140°F (-40°C to 60°C) Operating: 14°F to 122°F (-10°C to 50°C)
Resolution	± 0.1° or ± 1° for RTDs
Weight	3 ozs.
Certifications Available	CE Mark (standard) NIST traceability certificate (standard) Intrinsically Safe, MET Laboratories per CSA C22.2 & UL Class I Division I (standard)

DMS Software shown on PC (not included)

DMS

The Complete Calibration & Configuration Management Solution

Configuration Management

Meriam is the only single source manufacturer of calibrator, communicator and software that uses the same base technology for documenting changes to device configuration parameters. Smart field devices have parameters and values that make up the device configuration. Configuration changes can be made by direct communications from DMS to the Device via HART Modem, from the MFC (HART Communicator), or the MFT (Calibrator/Communicator). The integration of DMS with the MFT and MFC provide an advanced approach to device configuration management that is unmatched in the industry.

Device Specific Cloning
New devices can be configured and installed by copying similar existing devices. The user can clone the device information from multiple sources; an off the shelf device, the DMS database, or the DMS library of standard devices.

System Cloning
Copying of device information can be performed on a system basis as well. A system can be copied and used as a baseline for developing a similar system for a new division.

Calibration Management

Calibration Procedures
Calibration procedure details, such as number of test points and pass/fail criteria can be developed and applied to devices individually or in groups. These procedures are maintained in a library for future use and editing.

Scheduling/Planning
Calibration due dates can be assigned to devices, optimizing productivity through planning of calibration activities. Due dates can be assigned according to quality control, Safety Instrumented System ratings, or any other critical requirements. User definable pre-notices can be applied to notify users of coming calibration needs.

Calibration Alerts
Alert settings based on, for instance, calibration due date are assigned to devices and calibration equipment. When the criteria for the settings are met, the associated device is reported to an Alerts Log for easy access and disposition.

Action Lists
An Action List is the tool that DMS uses to group multiple activities to be assigned to calibration and maintenance technicians. The Action List is downloaded to the MFT and acts as a "To-Do List" of activities. The Action List activities are organized by DMS to track and ensure completion of assigned activities.

Preventative Maintenance
Utilization of the Action Lists and scheduling features enable the development of a preventive maintenance plan based on manufacturer's recommended calibration cycles, plant standard practices, or historical activity for a device.

Device History (Audit Trail)
Any action performed on a device is electronically stamped with date, time, user, description of activity, user ID and notes. Each device has its own log of associated activities. Trending of calibration results over the history of the device can be reviewed for predictive maintenance.

3rd Party Application Feature
DMS has a provision for the association of original manufacturers' software applications for devices like control valves, radar level devices, and flowmeters. Results from these applications are stored in DMS with the device history. The application can be launched from DMS when viewing device history.

DMS

The Complete Calibration & Configuration Management Solution

Ordering Information

DMS Client & Server Software

DMSBASXX-11-1	Calibration & configuration management where “xx” is 01, 05, 10, or 15 for number of clients.
DMSCFGXX-11-1	Configuration management only
DMSCALXX-11-1	Calibration management only

DMS Documenting Process Calibrator or Communicator Interface to DMS

DMSDP01-CFG	HART Field device configuration data interface
DMSDP01-CAL	Calibration procedures / results data interface
DMSDP01-ALL	Calibration & Configuration data interface

Documenting Process Calibrator (DPC) And Communicator Interface (MFT 4000 Series)

Calibration Equipment Tracking
The MFT, modules and MFC are electronically registered with DMS via the DPC Interface. Every action performed is associated with the unique ID of the equipment used.

Documenting Calibration and Configuration Data
The Documenting Process Calibrator/Communicator (DPC) reads and stores calibration test points/results (As-Found/As-Left), and device configuration changes.

Upload/Download Functions
Calibration Schedules (Action Lists) are generated by DMS and downloaded to the DPC for processing. Once the activities of the Action List are completed and documented by the DPC, the information is uploaded from the DPC to the DMS database. DMS tracks work-in-progress, planned calibration and planned configuration activities.

Industry Standard Compliance

Field Calibrator Interface Support
DMS uses an open standard for communicating with Documenting Process Calibrators (DPC’s).

Non-Proprietary
The DMS and MFT/MFC utilize a Device Object File (DOF) to communicate with HART devices. Although the DOF technology is protected, full access to the technology is available through the Device Management Solution’s open interface architecture.

Plant Application Compatibility
The DMS application was developed using SQL server database, which has features that lend itself to supporting ODBC data exchange and functionality with other plant applications. The DMS has export/import capabilities to support manual data exchange including features to map data from/to other popular device databases.

Device Management System (DMS) Software

MS SQL Data Server
Powerful Microsoft SQL data server provides network access via the DMS client application. This widely used database platform enables connectivity to other plant solutions.

Import/Export Utilities
Device data can be imported via DMS generated templates for the initial population of the DMS database and for exchanging data with other applications. Data that is imported can be mapped to the device’s HART configuration parameters. This also provides non-HART applications a “portal” to the device configurations.

Activity Logging
Logging of activities related to a device such as alerts, configuration, calibration or any other action that impacts a device.

Reporting/Queries
Standard reports, such as calibration certificates, activity log and scheduled activities. The user can generate custom queries that can be printed or exported for use in other applications.

Associated Documents
Provides links to relevant documents such as technical specifications, calibration certificates, standard operating procedures and CAD documents. When selected, the documents open in their native application.